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## Four new *Coleophora* Hübner, 1822 species from the Iberian Peninsula (Lepidoptera: Coleophoridae)

J. Tabell

### Abstract

Four new *Coleophora* Hübner, 1822 species, *C. septembra* Tabell, sp. n., *C. tigris* Tabell, sp. n., *C. aragonensis* Tabell, sp. n. and *C. forcipata* Tabell, sp. n. are described from the Iberian Peninsula. Habitus of the adults and the genitalia are illustrated. DNA barcodes are presented and compared to those of close relatives.

KEY WORDS: Lepidoptera, Coleophoridae, *Coleophora*, new species, Iberian Peninsula.

### Cuatro nuevas especies de *Coleophora* Hübner, 1822 de la Península Ibérica (Lepidoptera: Coleophoridae)

### Resumen

Se describen de la Península Ibérica cuatro nuevas especies de *Coleophora* Hübner, 1822, *C. septembra* Tabell, sp. n., *C. tigris* Tabell, sp. n., *C. aragonensis* Tabell, sp. n. and *C. forcipata* Tabell, sp. n. Se ilustran los adultos y genitalia. Se presenta el código de barras DNA y se compara con los de parientes próximos.

PALABRAS CLAVE: Lepidoptera, Coleophoridae, *Coleophora*, nuevas especies, Península Ibérica.

### Introduction

The Lepidoptera genus *Coleophora* Hübner, 1822 is well represented in the Iberian Peninsula with over 250 different species (available from <http://www.faunaeur.org/>). A remarkable portion of these taxa are considered endemic to this area. In the last century new species from this region were described especially by Toll (e.g. TOLL, 1960), and later by Glaser and Baldizzone (e.g. GLASER, 1981; BALDIZZONE, 1987; VIVES MORENO, 1987). The collecting trips made by Glaser and van der Wolf in the 1970-90's indicated that the Spanish Coleophoridae fauna is still insufficiently known. However, over the last 15 years no more than three new *Coleophora* taxa (plus two *Ischnophanes* Meyrick, 1891 taxa) have been described from the Iberian Peninsula, namely *C. lusitanica* Baldizzone & Corley, 2004, *C. luteochrella* Baldizzone & Tabell, 2009 and *C. alacanta* Tabell, 2013 (BALDIZZONE & CORLEY, 2004; BALDIZZONE & TABELL, 2009; TABELL, 2013). Recent expeditions to Spain, carried out by Jari Junnilainen, Timo & Kari Nupponen and the author have produced rich material of Coleophoridae, including several so far unknown species. In this article four new species of Coleophoridae are described from the Iberian Peninsula, namely *Coleophora septembra* Tabell, sp. n., *Coleophora tigris* sp. n., *Coleophora aragonensis* Tabell, sp. n. and *Coleophora forcipata* Tabell, sp. n.

Tissue samples (dried legs) from the specimens of these four new taxa were shipped to the Canadian Centre for DNA Barcoding in Guelph for DNA sequence analysis. On the same occasion

several samples of closely related species were also sent for barcoding. The barcoding results are discussed under Molecular diagnosis of each new species. Details of the barcoded specimens and their photographs are available through the following dataset (available from <http://dx.doi.org/10.5883/DS-COLSEP>).

Type specimens are deposited in the collections of MZH (Helsinki, Finland), A. Vives (MNCN, Madrid, Spain), M. Corley (Faringdon, England), J. Junnilainen (Vantaa, Finland), T. & K. Nupponen (Espoo, Finland) and J. Tabell (Hartola, Finland).

### Abbreviations:

MZH = Finnish Museum of Natural History, University of Helsinki, Finland

MNCN = Museo Nacional de Ciencias Naturales, Madrid, Spain

### *Coleophora septembra* Tabell, sp. n.

Barcode Index Number: BOLD:AAV8014

Holotype ♂ (GP 4895 J. Tabell, DNA sample 21983 Lepid. Phyl.), SPAIN, Granada, Sierra Nevada, Puerto de la Ragua 4.5 km S, 1780 m, 23-IX-2012, J. Tabell leg., coll. MZH.

Paratypes (14 ♂♂, 13 ♀♀): 6 ♂♂: (GP 5260 J. Tabell), 9 ♀♀ (GP 4943 J. Tabell, DNA sample 21984 Lepid. Phyl.; GP 5261 J. Tabell) same collecting data as in holotype, colls. A. Vives / MNCN and Tabell; 1 ♂ (Gen. prep. 3145 J. Tabell), SPAIN, Granada, Sierra Nevada 1400 m, Granada 15 km SE, 30-IX-1997, T. Nupponen leg., coll. T. & K. Nupponen; 1 ♂ (Gen. prep. 4180 J. Tabell, DNA sample 20095 Lepid. Phyl.), Spain, Aragón, Teruel, Albarracín, 5 km W, 13-IX-2004, K. Nupponen leg., coll. T. & K. Nupponen; 4 ♀♀ (GP 5251 J. Tabell), SPAIN, Castilla y León, prov. Ávila, Guisando 5 km NW, Sierra de Gredos, 1150-1400 m, 19-IX-2012, T. Nupponen leg., colls. T. & K. Nupponen and Tabell; 4 ♂♂ (GP 5249, 5262 J. Tabell), PORTUGAL, Trás-os-Montes, Montalegre, Mourilhe, 15-IX-1973, P. Grotenfelt leg., colls. MZH and Tabell; 1 ♂, PORTUGAL, Beira Alta, Lamego, 19-IX-1973, P. Grotenfelt leg., coll. MZH; 1 ♂ (Gen. prep. 1999), PORTUGAL, Beça, Boticas, Trás-os-Montes, 22-IX-2003, leg. M. Corley, coll. Corley.

Paratypes are deposited in the collections of MZH (Helsinki, Finland), A. Vives (MNCN, Madrid, Spain), J. Tabell (Hartola, Finland), M. Corley (Faringdon, England) and T. & K. Nupponen (Espoo, Finland).

Diagnosis: According to the external appearance and the genitalia structures *C. septembra* Tabell, sp. n. belongs to the *C. onobrychiella* Zeller, 1849 species group. The moths of this species group are usually yellowish brown with light costal line, and most species cannot be safely determined without examining the genitalia. The genitalia of *C. septembra* are similar to those of *C. genistae* Stainton, 1857, *C. saturatella* Stainton, 1850 and *C. trifariella* Zeller, 1849, but differ by a more acute-tipped sacculus in the male genitalia. The female genitalia display only minor separating details, above all the more conical sterigma.

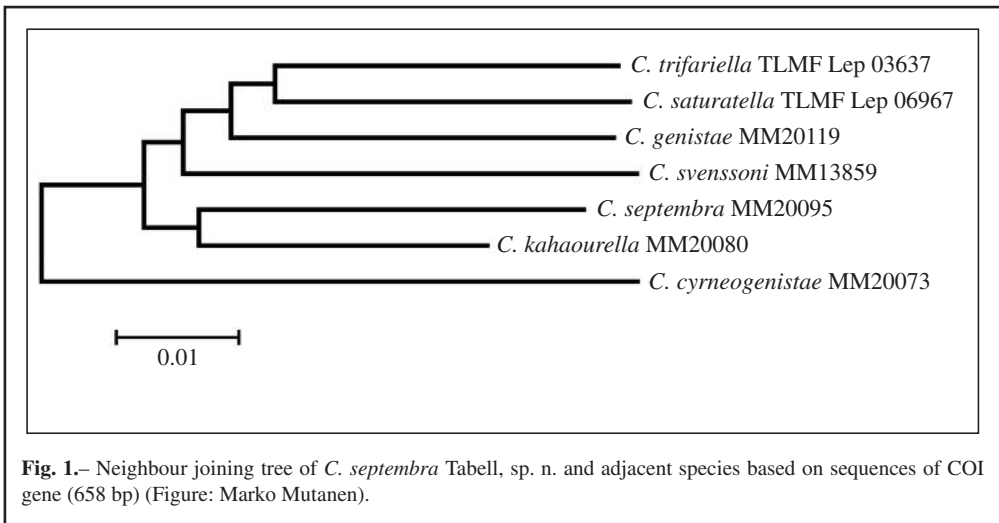
Molecular diagnosis: Three specimens of *C. septembra* were successfully sequenced, resulting in a 658 bp, full-length barcode fragment for two specimens, and a fragment of 636 bp for one specimen. The DNA barcodes were compared to those of six closely related species (*C. cyrneogenistae* Varenne & Nel, 2014, *C. genistae*, *C. kahaourella* Toll, 1957, *C. saturatella*, *C. svenssoni* Baldizzone, 1985, *C. trifariella*). The results reveal a distinct divergence between *C. septembra* and the other barcoded taxa (Fig. 1). Among these species the mean interspecific divergences varies from 5.24 % to 10.01%, and the closest neighbour for *C. septembra* is *C. kahaourella* (Table 1). Consequently, the results support the status of *C. septembra* as a distinct species.

Description (Fig. 3): Wingspan 11-14.5 mm. Head white, tinged with pale brown. Antenna white, annulated with brown. Scape with pale brown or pale ochreous elongate scales, not forming a long tuft. Labial palp pale brown, whitish below, second article 1.5 x longer than third article. Thorax white with pale ochreous median line; tegula pale ochreous. Forewing ochreous brown, dorsal half slightly paler,

stripes white; costal stripe narrow, from base to near apex, median stripe narrow, from base to 2/5, dorsal stripe distinct only at base, outer margin sparsely with white scales. Costal fringe white, towards apex pale brown, dorsal fringe pale brownish grey. Hindwing pale grey, fringe brownish grey. Abdomen brownish grey, lustrous.

**Table 1.**– Interspecific mean K2P divergences (>600 bp) based on the analysis of COI gene. Maximum intraspecific variations in diagonal grey cells. The number of examined specimens in parenthesis.

	<i>C. septembra</i>	<i>C. cyrneogenistae</i>	<i>C. genistae</i>	<i>C. kahaourella</i>	<i>C. saturatella</i>	<i>C. svenssoni</i>	<i>C. trifariella</i>
<i>C. septembra</i> (3)	0.8	9.68	6.73	5.24	7.75	7.75	8.26
<i>C. cyrneogenistae</i> (2)	9.68	0.61	10.01	8.13	9.59	9.87	8.34
<i>C. genistae</i> (3)	6.73	10.01	0	6.73	5.97	6.48	6.66
<i>C. kahaourella</i> (2)	5.24	8.13	6.73	0.15	7.08	6.41	6.72
<i>C. saturatella</i> (1)	7.75	9.59	5.97	7.08	N	7.31	5.77
<i>C. svenssoni</i> (3)	7.75	9.87	6.48	6.41	7.31	0.15	7.47
<i>C. trifariella</i> (1)	8.26	8.34	6.66	6.72	5.77	7.47	N



Abdominal structures (Figs. 10, 13) No posterior lateral struts. Transverse strut slightly convex, proximal margin straight, evenly sclerotized, distal margin constricted medially. Tergal sclerites 3 x longer than wide, covered with 45-55 conical spines (3<sup>rd</sup> tergum).

Male genitalia (Figs. 7-9): Gnathos knob large, transversely oval. Tegumen rather broad, hourglass-shaped, pedunculi short. Transtilla short, triangular. Cucullus elongate, moderately narrow. Valvula triangular, outer margin well delineated. Sacculus chitinized; ventral margin convex, terminating in acute protuberance; dorsal margin concave. Phallosome conical, slightly arched, dorsally sclerotized tube. Vesica transparent, with several curved long cornuti grouped in three bundles.

Female genitalia (Figs. 11-12): Papillae anales oval, covered with longish bristles. Tergum 8 trapezoid, well sclerotized, anteriorly bilobate, caudal margin convex. Anterior apophyses slightly longer than sterigma, posterior apophyses twice as long as anterior ones. Sterigma trapezoid, laterally broadly membranous; proximal margin straight; caudal margin rounded, lined with several long bristles, medial excavation wide and deep, lined with few short bristles. Ostium bursae wide, U-shaped, situated at anterior half of sterigma. Antrum chalice-shaped, distal margin broadly and

strongly chitinized, median lamina broad. Spinulate section of ductus bursae long, coiled once; median lamina extended beyond spinulate section, coiled; anterior section transparent, narrow, at level of ductus seminalis several small spinules. Corpus bursae round with one leaf-like signum.

Bionomy: All specimens have been captured in September by light (8 W and 20 W fluorescent tubes). Biology is unknown.

Distribution: So far the new taxon is known from Portugal (northern provinces of Beira Alta and Trás-os-Montes e Alto Douro) and Spain (provinces of Granada and Teruel).

Derivation of name: The specific name refers to the flight period of adults in September.

***Coleophora tigris* Tabell, sp. n**

Barcode Index Number: BOLD:ACT0660

Holotype ♂ (DNA sample 23600 Lepid. Phyl.), SPAIN, Granada, Motril, 7.5 km N, 100 m, N36.81134 W3.54550, 10-IV-2014, J. Tabell leg., coll. MZH.

Paratypes (15 ♂♂, 3 ♀♀): 10 ♂♂ (GP 5218 JT), 2 ♀♀ (GP 5220 J. Tabell; DNA sample 23601 Lepid. Phyl.), same collecting data as in holotype, colls. A. Vives / MNCN and Tabell; 1 ♂ (DNA sample 23599 Lepid. Phyl.), SPAIN, Granada, Sierra Nevada, 1420 m, Juviles, 3 km W, 8-VI-2010, J. Tabell leg., coll. Tabell; 4 ♂♂ (GP 5155 J. Tabell), 1 ♀ (GP 5156 J. Tabell, DNA sample 23649 Lepid. Phyl.), SPAIN, Granada, Motril, 10 km N, 23-IV-2001, J. Junnilainen leg., colls. Junnilainen and Tabell.

Diagnosis: *Coleophora tigris* Tabell, sp. n. is a moderately small moth, characterized by white-yellow-brown-striped wing-pattern. Externally it resembles *C. brunneosignata* Toll, 1944, but the dark scales on forewing are more suffused than in *C. brunneosignata* and other species of *C. vulnerariae* species group. The genitalia of *C. tigris* resemble those of *C. glaseri* Toll, 1961, *C. turbatella* Toll, 1944 and *C. marcarolensis* Baldizzzone, 2004. The main distinguishing characters in the male genitalia are the larger gnathos knob and apical tooth on sacculus in *C. tigris*, and the shape of cornuti (longer than in *C. turbatella* and *C. marcarolensis*, similar with *C. glaseri*). In the female genitalia the separating details are the shape of sterigma (in *C. turbatella* and *C. glaseri* narrower than in *C. tigris*, in *C. marcarolensis* similar to *C. tigris*) and the length of spinulate section of ductus bursae (in *C. marcarolensis* shorter, in *C. turbatella* and *C. glaseri* longer than in *C. tigris*).

Molecular diagnosis: Four specimens of *C. tigris* sp. nov. were sequenced successfully, resulting in 658 bp (n=2), 636 bp and 565 bp barcode fragments. The resultant sequences display 0.36 % maximum intraspecific variation. The DNA barcodes were compared to those of three closely related taxa belonging to the *C. vulnerariae* species group (*C. brunneosignata*, *C. marcarolensis* and *C. turbatella*). The results reveal a distinct, 6.38-10.54 % divergence between the species (Table 2). So far there exist no barcodes in BOLD for morphologically closely related species *C. glaseri*.

**Table 2.**— Interspecific mean K2P divergences (>600 bp) based on the analysis of COI gene. Maximum intraspecific variations in diagonal grey cells. The number of examined specimens in parenthesis.

	<i>tigris</i>	<i>brunneosignata</i>	<i>marcarolensis</i>	<i>turbatella</i>
<i>tigris</i> (4)	0.36	8.77	6.96	8.58
<i>brunneosignata</i> (3)	8.77	0.46	9.86	10.54
<i>marcarolensis</i> (1)	6.96	9.86	N	6.38
<i>turbatella</i> (5)	8.58	10.54	6.38	1.0

Description (Fig. 4): Wingspan 12.5-15 mm, female 10-12 mm. Head white, medially pale ochreous to pale brown. Antenna white, annulated with brown. Scape white, below shortly tufted by

white and pale brown scales. Labial palp whitish, second article 1.5 x longer than third article. Thorax white, medially mixed with yellow and pale brown, tegula white, mixed with pale brown. Forewing yellow with a narrow white costal stripe to 5/6 and four dark brown stripes; one below costal stripe from base to apex, extended apically; two medial stripes fused basally, longer upper stripe to near apex, lower to tornus; one dorsal stripe; medial and dorsal stripes mixed with white scales forming short lines. Costal fringe dark brown, dorsal fringe slightly paler. Hindwing pale brownish grey, fringe pale brown. Abdomen yellowish brown, lustrous.

Male genitalia (Figs. 14-16): Gnathos knob crescent-shaped, lower margin concave, arms long and narrow. Tegumen long, slightly conical, pedunculus short. Transtilla wedge-shaped, upcurved. Costa concave. Cucullus narrow and long, apically slightly broader. Valvula well sclerotized, covered with bristles, ventral margin strongly sclerotized. Phallosome conical tube, dorsally arched and strongly sclerotized. Sacculus short, strongly sclerotized, margin rounded; characterized by a darkly sclerotized subapical tooth; apical part densely covered with bristles of different size. Vesica membranous, with an annulus and weakly sclerotized, long and curved cornutus.

Female genitalia (Figs. 18-19): Papillae anales oval, sparsely covered with long and short bristles. Tergum 8 lightly sclerotized, anteriorly bilobate. Anterior apophyses 1.25x longer than sterigma, posterior apophyses almost twice as long as anterior ones. Sterigma trapezoid, laterally membranous, apical fifth covered with bristles; proximal margin straight; caudal margin rounded, medial excavation wide and deep, lined with few stud-shaped bristles. Ostium bursae wide, U-shaped, situated at anterior half of sterigma. Antrum chalice, median lamina caudally broad, extended into antrum. Spinulate section of ductus bursae 3.5x longer than sterigma, curved, lamina extended beyond spinulate section, twisted; anterior section transparent, straight. Corpus bursae oval with one leaf-like signum, spine broad, base with a pair of small nodules.

Abdominal structures (Figs. 17, 20): Latero-posterior bar absent. Transverse bar broad, convex, proximal edge clearly sclerotized only medially, distal edge evenly sclerotized. Tergal sclerite about 3x longer than wide, covered with 35 conical spines (3<sup>rd</sup> tergum).

Biology: Early stages unknown.

Distribution: So far known from three localities in southern Spain, province Granada, at an altitude between 100 m and 1420 m.

Derivation of name: The specific name refers to a tiger (*Panthera tigris*), considering its coloration.

***Coleophora aragonensis* Tabell, sp. n.**

Barcode Index Number: BOLD:ACF3723

Holotype ♂ (GP 4680 J. Tabell), SPAIN, Aragón, prov. Teruel, Teruel 9 km NNE, Villalba Baja, 960-1030 m, 13-VI-2008, K. Nupponen leg., coll. T. & K. Nupponen (holotype currently deposited in collection of Nupponen can be borrowed through MZH).

Paratypes (13 ♂♂, 2 ♀♀): 1 ♀ (GP 4676 J. Tabell) same data as in holotype; 6 ♂♂ same locality as in holotype, but 27-IV-2009, T. & K. Nupponen leg., colls. T. & K. Nupponen and Tabell; 1 ♀ same data as in holotype, but 970 m, 17-V-2007, coll. T. & K. Nupponen; 4 ♂♂ (DNA sample 16502 Lepid. Phyl.), SPAIN, Aragón, prov. Zaragoza, Los Monegros, Caspe 7 km N, 18-V-2004, J. Junnilainen leg., coll. Junnilainen; 3 ♂♂ (Gen. prep. 3748 J. Tabell, DNA sample 16501 Lepid. Phyl.; Gen. prep. 3834 J. Tabell), SPAIN, Aragón, prov. Zaragoza, Los Monegros, Gelsa, 10 km NW, 21-V-2004, J. Junnilainen leg., colls. A. Vives / MNCN, Junnilainen and Tabell.

Diagnosis: Externally *C. aragonensis* Tabell, sp. n. is similar to several smallish, striped pale brown Coleophoridae moths. Examination of the genitalia is required for confident determination. According to the genitalia structures the new taxon is most close to *C. sarehma* Toll, 1957, the distribution range of which extends from the Canary Islands to Iran and Turkey, through the northern African countries (BALDIZZONE *et al.*, 2006). Another close relative is *C. scabrida* Toll, 1959, a species widely distributed in Europe (BALDIZZONE *et al.*, 2006). In *C. aragonensis* the

lateral margin of sacculus is swollen and more serrated, cucullus is narrower and the apical tooth of phallosome larger. In *C. scabrida* the dorsal protuberance is acute-tipped and the lower phallosome rod strongly swollen. In the female genitalia the main distinguishing characters are shape of the sterigma (rectangular in *C. aragonensis* and *C. scabrida*, conical in *C. sarehma*), length and width of the antrum (short and broad in *C. aragonensis*, long and broad in *C. scabrida*, long and narrow in *C. sarehma*), and length of spinulate section of ductus bursae (in *C. aragonensis* and *C. sarehma* longer than antrum, in *C. scabrida* shorter than antrum).

Molecular diagnosis: Samples of two specimens of *C. aragonensis* were sent for barcoding. Both samples were sequenced successfully, resulting in full 658 bp barcode fragments. The DNA barcodes were compared to that of *C. sarehma* (n=1), showing 1.99 % interspecific divergence (no intraspecific variation). This distance gap is congruent with the obvious morphological differences and supports the status of *C. aragonensis* as a distinct species.

Description (Fig. 5): Wingspan 12.5-13 mm. Head pale brown, whitish laterally. Antenna white, annulated with dark brown. Scape brown, not tufted. Labial palp whitish, outer surface of second article brown, second article 1.5 x longer than third article. Thorax pale brown mixed with white. Forewing mottled, pale brown with creamy white indistinctly edged longitudinal stripes and scattered dark brown scales; costal stripe from base to 2/3. Costal fringe creamy white, dorsal fringe pale brown, apically paler. Hindwing pale brown, fringe pale brown, apically paler. Abdomen pale grey, slightly lustrous.

Abdominal structures (Figs. 24, 27) No posterior lateral struts. Transverse strut slightly convex, proximal margin broad, distal margin medially bulged. Tergal sclerites 4 x longer than wide, covered with 20-25 conical spines (3<sup>rd</sup> tergum).

Male genitalia (Figs. 21-23): Gnathos knob elongate, arms short. Tegumen rectangular, short, pedunculi longer than tegumen, basally bulged. Transtilla wedge-shaped. Costa basally bulged, cucullus elongate, moderately narrow, basally constricted. Valvula narrower than cucullus, ventral margin evenly rounded. Sacculus well chitinized; ventral margin oblique, almost straight, obtuse-angled; lateral margin shallowly serrated, convex, ending in robust and inwards curved protuberance exceeding costa. Phallosome rods narrow, divergent, lower rod (lateral aspect) longer with robust apical triangular tooth. Vesica rather short, ventrally slightly chitinized, with two to three cornuti in tight cluster.

Female genitalia (Figs. 25-26): Papillae anales elongate, narrow, covered with longish bristles. Anterior apophyses slightly longer than sterigma, posterior apophyses twice as long as anterior ones. Sterigma transverse, almost twice as wide as long, in proximal portion two curved oblique wrinkles; proximal margin rounded, medially deeply concave; caudal margin almost straight, broadly more strongly chitinized, sparsely lined with long bristles, medial excavation 1/5 x width of sterigma. Ostium bursae V-shaped, situated medially on sterigma. Antrum chalice-shaped, longer than sterigma, about 1/3 x width of sterigma, curved, posterior third strongly chitinized, in anterior half elongate sclerotization. Spinulate section of ductus bursae 3 x longer than sterigma, semicircular, twisted, median lamina present, spinules small; middle section coiled, darkly sclerotized; anterior section transparent. Corpus bursae oval with one leaf-like signum.

Bionomy: The larval case and host plant are unknown. The habitats are xerothermic calcareous slopes with sparse vegetation (e.g. *Thymus* and *Helianthemum*) (Fig. 2).

Distribution: So far the new taxon is known from three localities in the Spanish provinces of Teruel and Zaragoza.

Derivation of name: The specific name refers to the region of Aragon, where the collecting sites of *C. aragonensis* are located.

***Coleophora forcipata* Tabell, sp. n.**

Barcode Index Number: BOLD:ACT4012

Holotype ♂ (GP 4681 J. Tabell, DNA sample 23645 Lepid. Phyl.), SPAIN, Aragón, prov.





**Fig. 2.**– Type locality of *C. aragonensis* Tabell, sp. n. and *C. forcipata* Tabell, sp. n. in Teruel, Spain (Photo: Kari Nupponen).

Teruel, Teruel 9 km NNE, Villalba Baja, 960-1030 m, 13-VI-2008, K. Nupponen leg., coll. T. & K. Nupponen (holotype currently deposited in collection of Nupponen can be borrowed through MZH).

Paratypes (10 ♂♂, 4 ♀♀), 6 ♂♂, 4 ♀♀ (GP 5099 J. Tabell, DNA sample 23646 Lepid. Phyl; GP 5263 J. Tabell; GP 5413 J. Tabell): same collecting locality as in holotype, but 1000 m, 13-IX-2007, T. Nupponen leg., colls. A. Vives / MNCN, T. & K. Nupponen and Tabell; 2 ♂♂, SPAIN, Aragón, prov. Zaragoza, Los Monegros, Gelsa 8 km NE, 270 m, 11-IX-2007, T. Nupponen leg., coll. T. & K. Nupponen; 1 ♂ same collecting data, but 12-IX-2007, coll. Tabell; 1 ♂, SPAIN, Castilla y León, prov. Zamora, Zamora 6 km W, 14-IX-2007, T. Nupponen leg., coll. T. & K. Nupponen.

Diagnosis: *C. forcipata* Tabell, sp. n is a middle-sized species, and on account of typical coloration, viz. light brown forewing with white longitudinal stripes and dark scales, a secure determination requires the scrutiny of genitalia structures. According to the genitalia of both sexes *C. forcipata* belongs to the *C. dianthivora* species group and is most closely related to *C. agenjoi* Toll, 1960, a species known from Spain (BALDIZZONE *et al.*, 2006) and Portugal (CORLEY *et al.*, 2011). In the male genitalia a large fork-shaped appendix of the lower phallosome rod readily distinguishes *C. forcipata* from *C. agenjoi* and the other relatives, e.g. *C. riffelensis* Rebel, 1913. In general, the shape of phallosome rods is the most valuable genitalic character in separating



different taxa of the *C. dianthivora* species group. In the female genitalia of *C. forcipata* shape of the sterigma with medial opening is unique.

Molecular diagnosis: Samples of two specimens of *C. forcipata* were sent for barcoding. Both samples were sequenced successfully, resulting in full 658 bp barcode fragments. The barcodes display 0.15 % intraspecific variation, whereas the interspecific divergence between *C. forcipata* and *C. riffelensis* is 3.87 %. So far there exist barcodes neither for the morphologically most closely related species *C. agenjoi*, nor for its numerous Asian relatives in BOLD. Consequently, the usage of existing barcodes as a taxonomical tool in *C. dianthivora* species group is not very useful.

Description (Fig. 6): Wingspan 14-17 mm. Antenna white, unringed or indistinctly annulated with pale brown. Scape whitish, not tufted. Labial palp pale brown mixed with whitish, second article 1.5 x longer than third article. Thorax pale brown mixed with white. Forewing mottled, pale brown with white longitudinal stripes and scattered blackish scales; costal stripe from base to 4/5, median stripe from base to apex, joined with a stripe along fold, dorsal stripe from base to apex; in apical area three indistinctly edged short stripes. Fringe white mixed pale brown along costal margin, at dorsal margin pale brown, tipped whitish. Hindwing pale greyish brown, fringe pale brown, tipped whitish. Abdomen light grey, slightly lustrous.

Abdominal structures (Figs. 31, 34): No posterior lateral struts. Transverse strut slightly convex, both margins broadly sclerotized. Tergal sclerites 4 x longer than wide, covered with 25 conical spines (3<sup>rd</sup> tergum).

Male genitalia (Figs. 28-30): Gnathos knob elongate, narrow. Tegumen hourglass-shaped, pedunculi slightly bulged. Transtilla arrowhead-shaped, upwards oblique. Costa deeply concave, cucullus rounded. Valvula small, outer margin well delineated, densely outlined with small bristles, ventral margin evenly rounded. Saccus broad, thickly sclerotized; ventral and lateral margins unevenly curved, ending in robust and inwards curved digitate protuberance exceeding costa; dorsal margin almost parallel with lateral margin, with one small tooth. Phallosome rods curved, upper rod (lateral aspect) twice as long as lower rod, gradually thinning towards apex; lower rod broad, ending in fork-shaped formation, its lower branch twice longer than upper branch. Vesica rather short, two distally arched small cornuti grouped together.

Female genitalia (Figs. 32-33): Papillae anales elongate, narrow, covered with longish bristles. Anterior apophyses slightly shorter than sterigma, posterior apophyses twice as long as sterigma. Sterigma markedly sclerotized, with large medial opening, apical fifth covered with bristles; proximal margin slightly convex, caudal margin rounded; medial excavation short, conical, lined with few bristles. Ostium bursae broadly U-shaped. Antrum as long as sterigma, sack-shaped, lateral edges more strongly sclerotized. Spinulate section of ductus bursae twice longer than sterigma, with median lamina, followed by large, sclerotized coil; anterior section gradually widening into oval corpus bursae. Signum leaf-shaped, spine short.

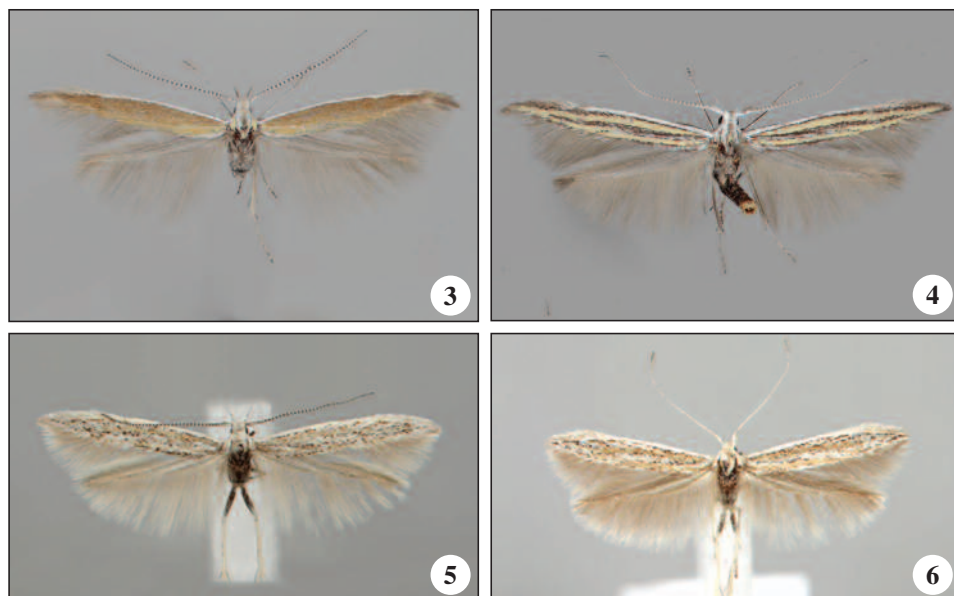
Bionomy: The larval case and host plant are unknown. The habitats are xerothermic calcareous slopes with sparse vegetation (e.g. *Thymus* and *Helianthemum*) (Fig. 2).

Distribution: *C. forcipata* is known from three Spanish provinces, Teruel, Zamora and Zaragoza.

Derivation of name: The specific name refers to the fork-shaped tip of the lower phallosome rod in the male genitalia.

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**Figs. 3-6.**– Adults: **3.** *C. septembra* Tabell, sp. n., male paratype, Spain, Sierra Nevada. **4.** *C. tigris* Tabell, sp. n., male paratype, Spain, Granada (Photos: Juha Tyllinen). **5.** *C. aragonensis* Tabell, sp. n., holotype, Spain, Aragon. **6.** *C. forcipata* Tabell, sp. n., holotype, Spain, Teruel (Photos: Reijo Siloaho).

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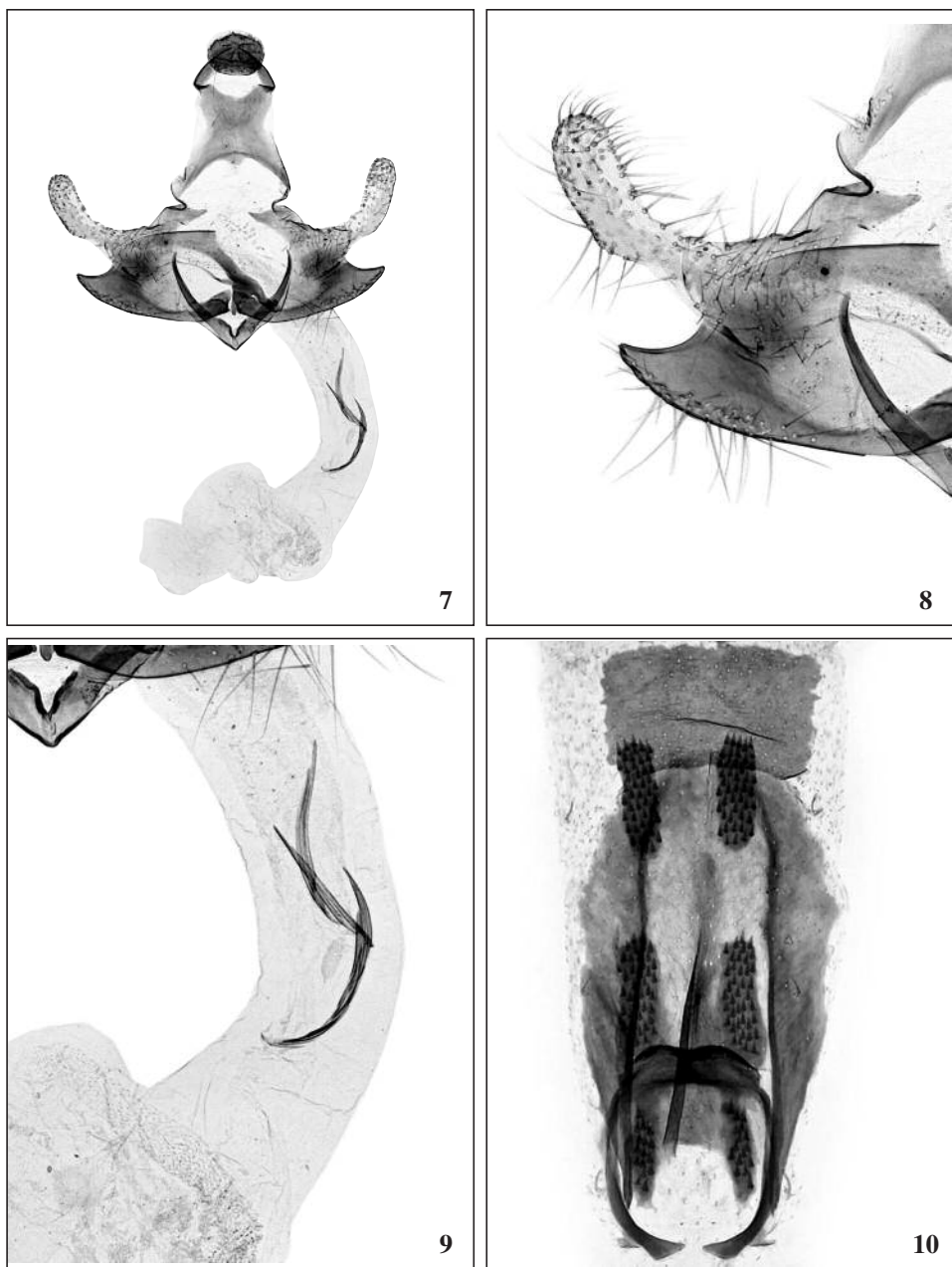
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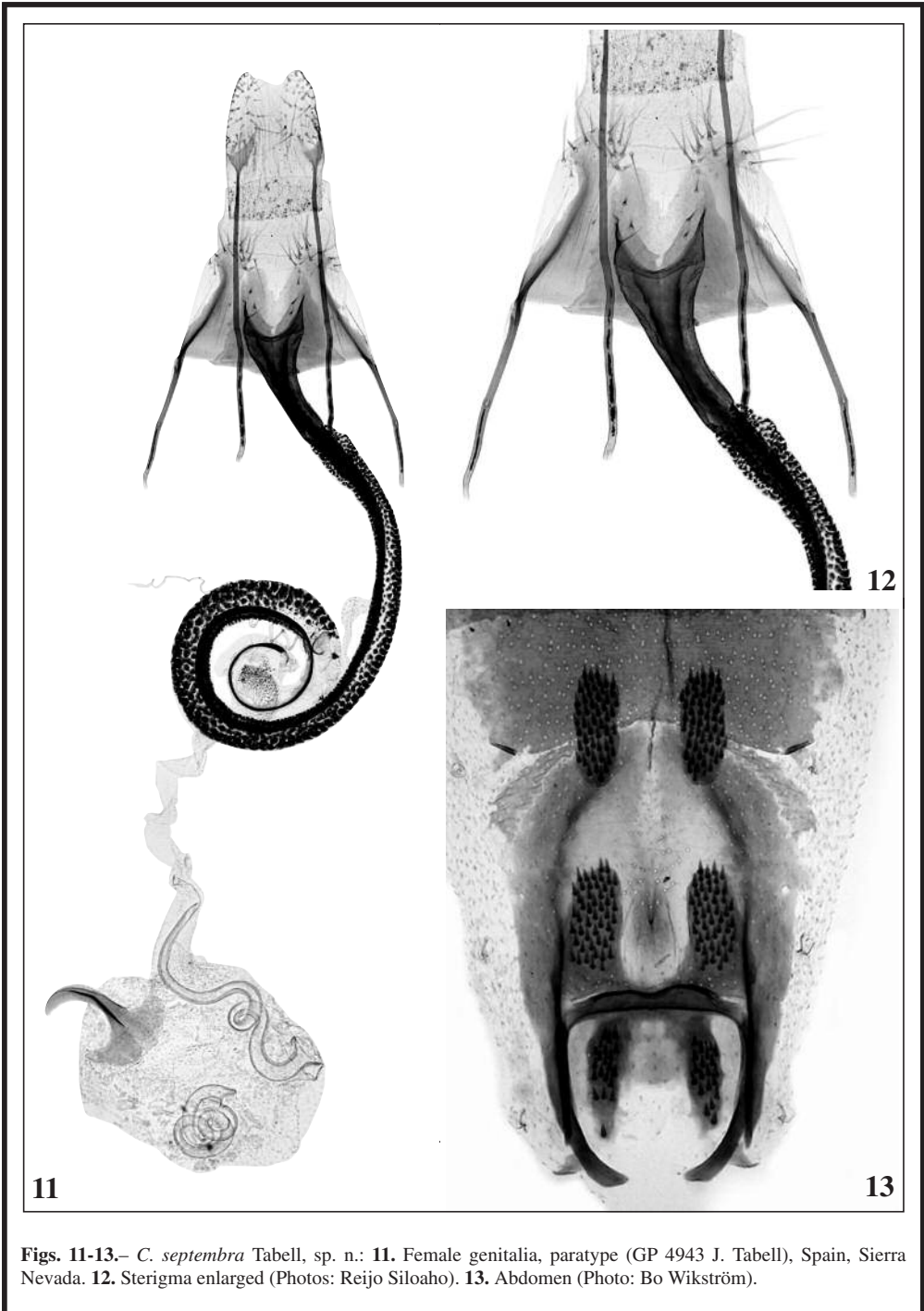
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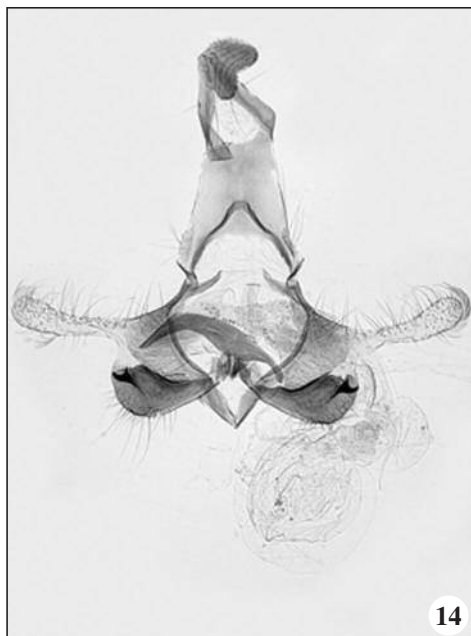
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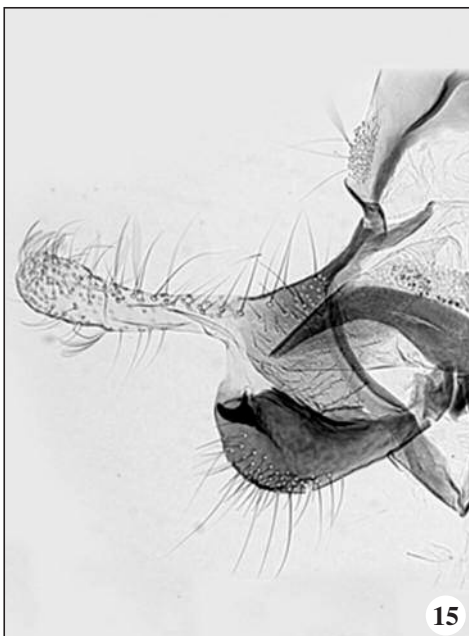
**Figs. 7-10.**– *C. septembra* Tabell, sp. n.: **7.** Male genitalia, holotype (GP 4895 J. Tabell), Spain, Sierra Nevada. **8.** Cucullus and sacculus enlarged. **9.** Cornuti enlarged. (Photos: Reijo Siloaho). **10.** Abdomen (Photo: Bo Wikström).



**Figs. 11-13.**– *C. septembra* Tabell, sp. n.: **11.** Female genitalia, paratype (GP 4943 J. Tabell), Spain, Sierra Nevada. **12.** Sterigma enlarged (Photos: Reijo Siloaho). **13.** Abdomen (Photo: Bo Wikström).



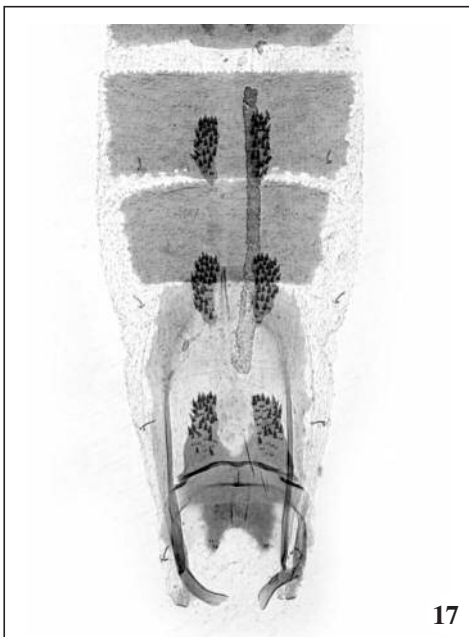
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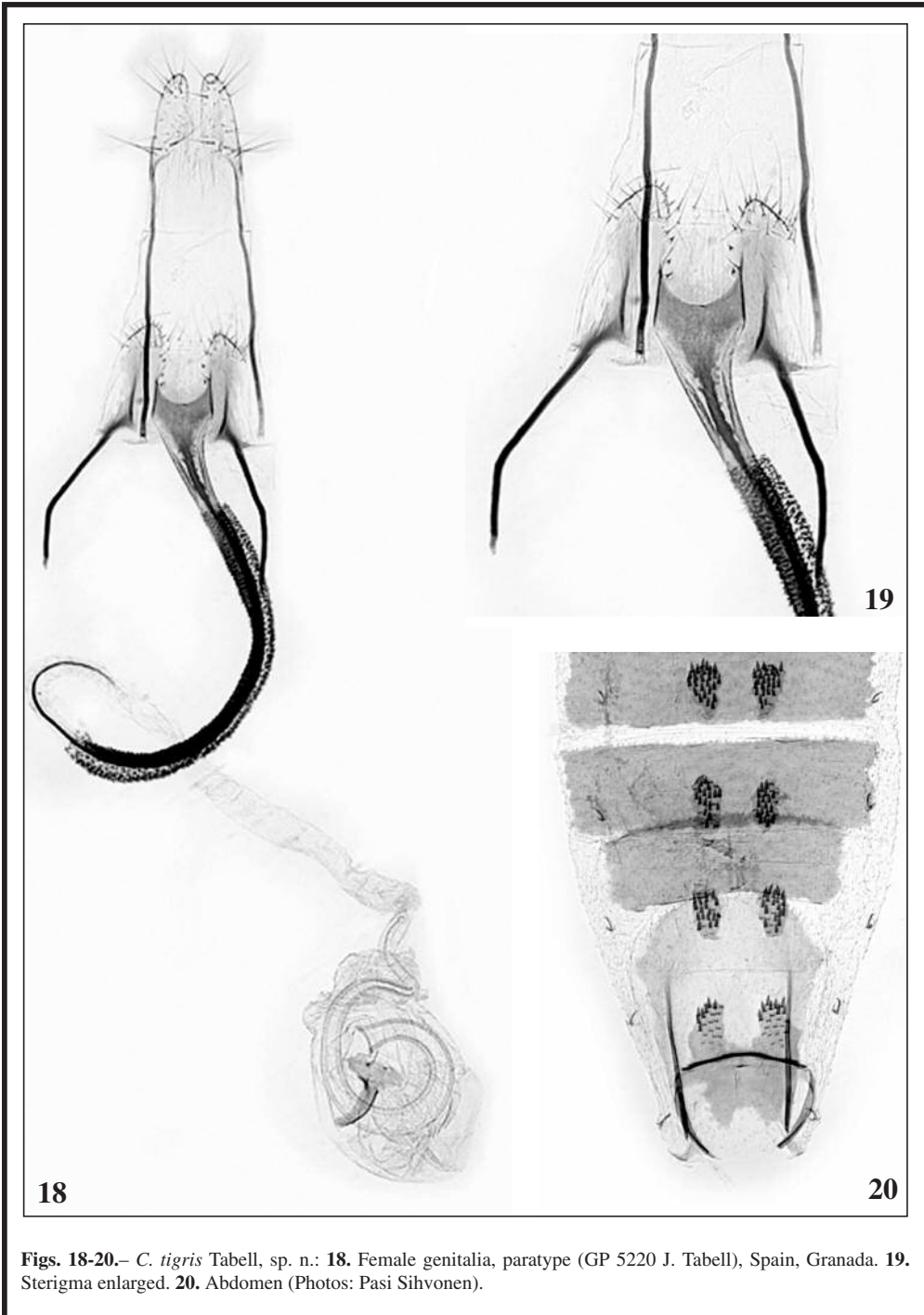
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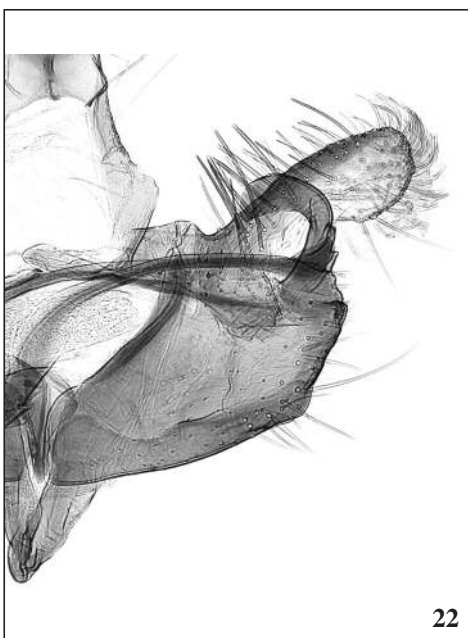
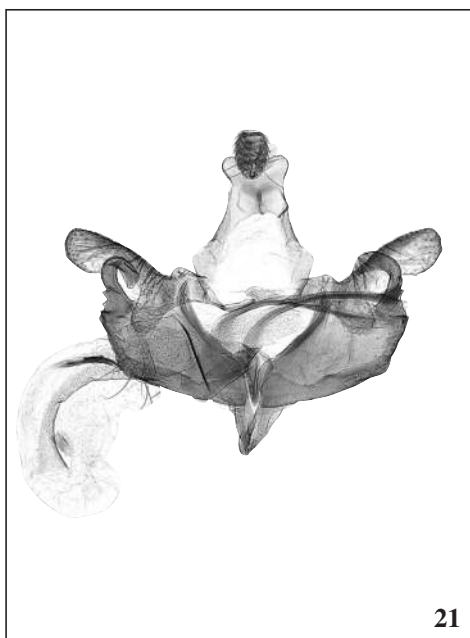


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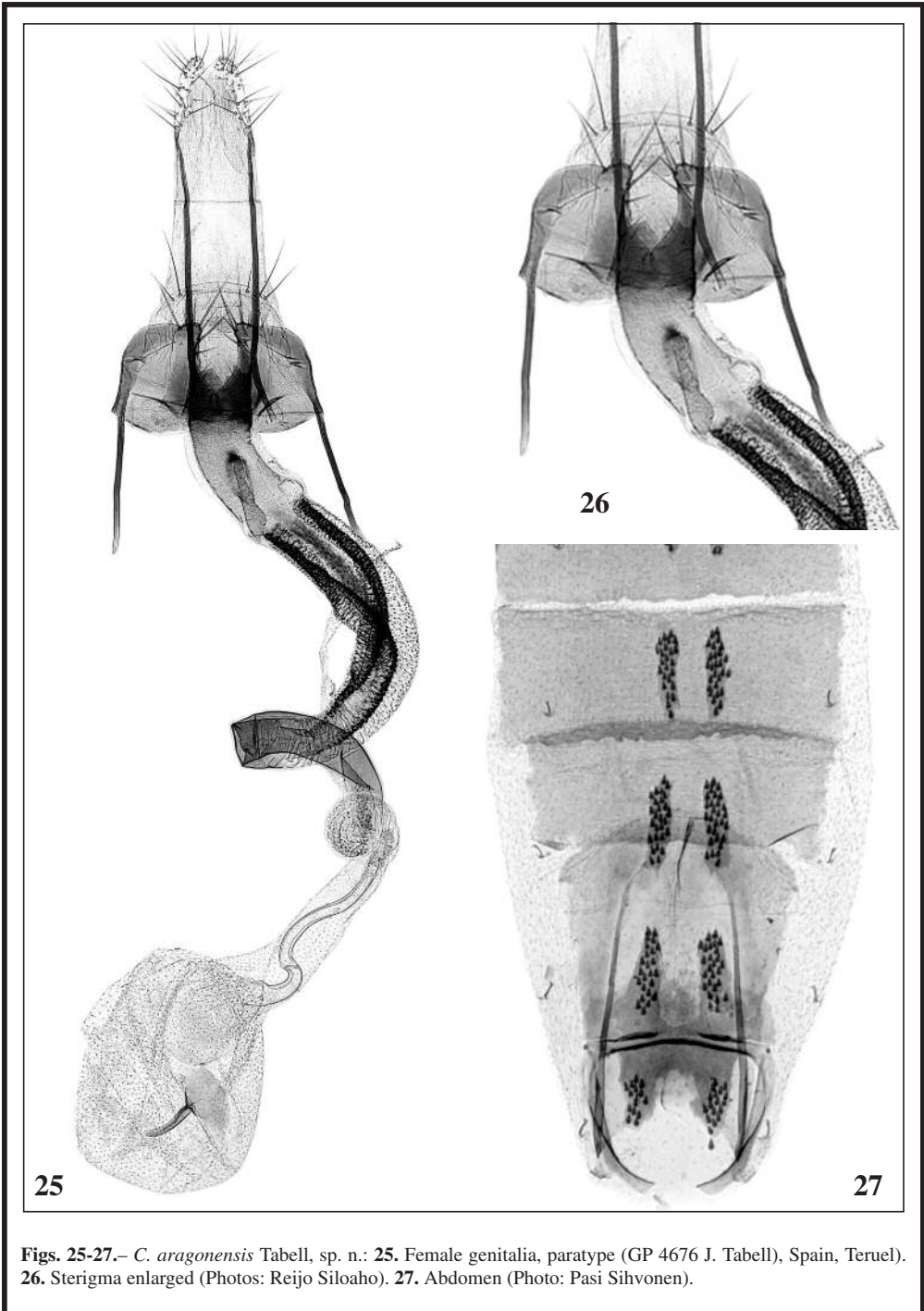
**Figs. 14-17.**– *C. tigris* Tabell, sp. n.: **14.** Male genitalia, paratype (GP 5218 J. Tabell), Spain, Granada. **15.** Cucullus and sacculus enlarged. **16.** Cornuti enlarged. **17.** Abdomen (Photos: Pasi Sihvonen).



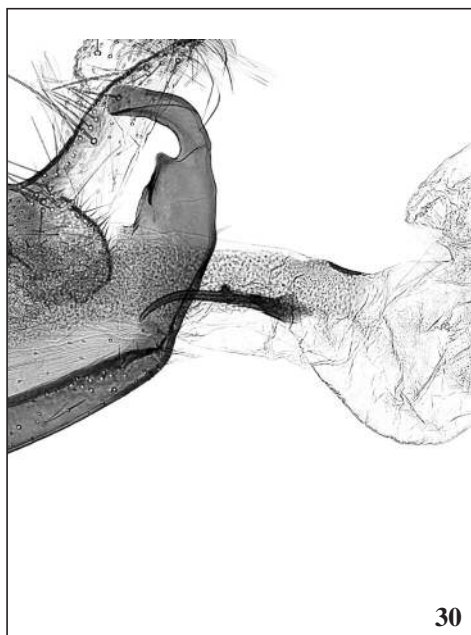
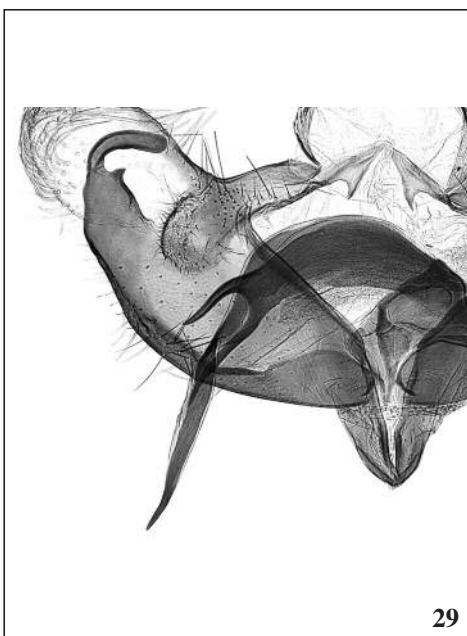
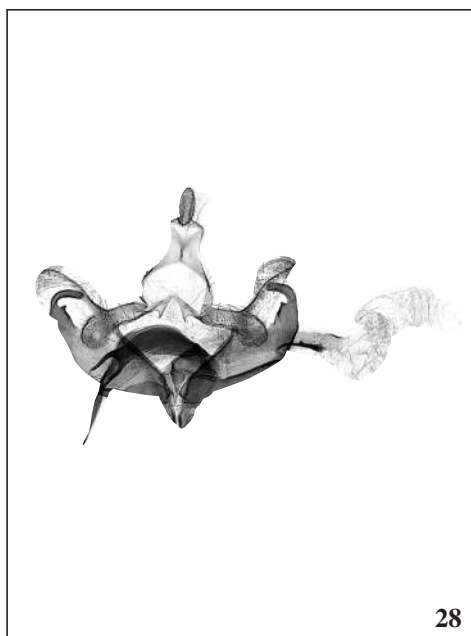




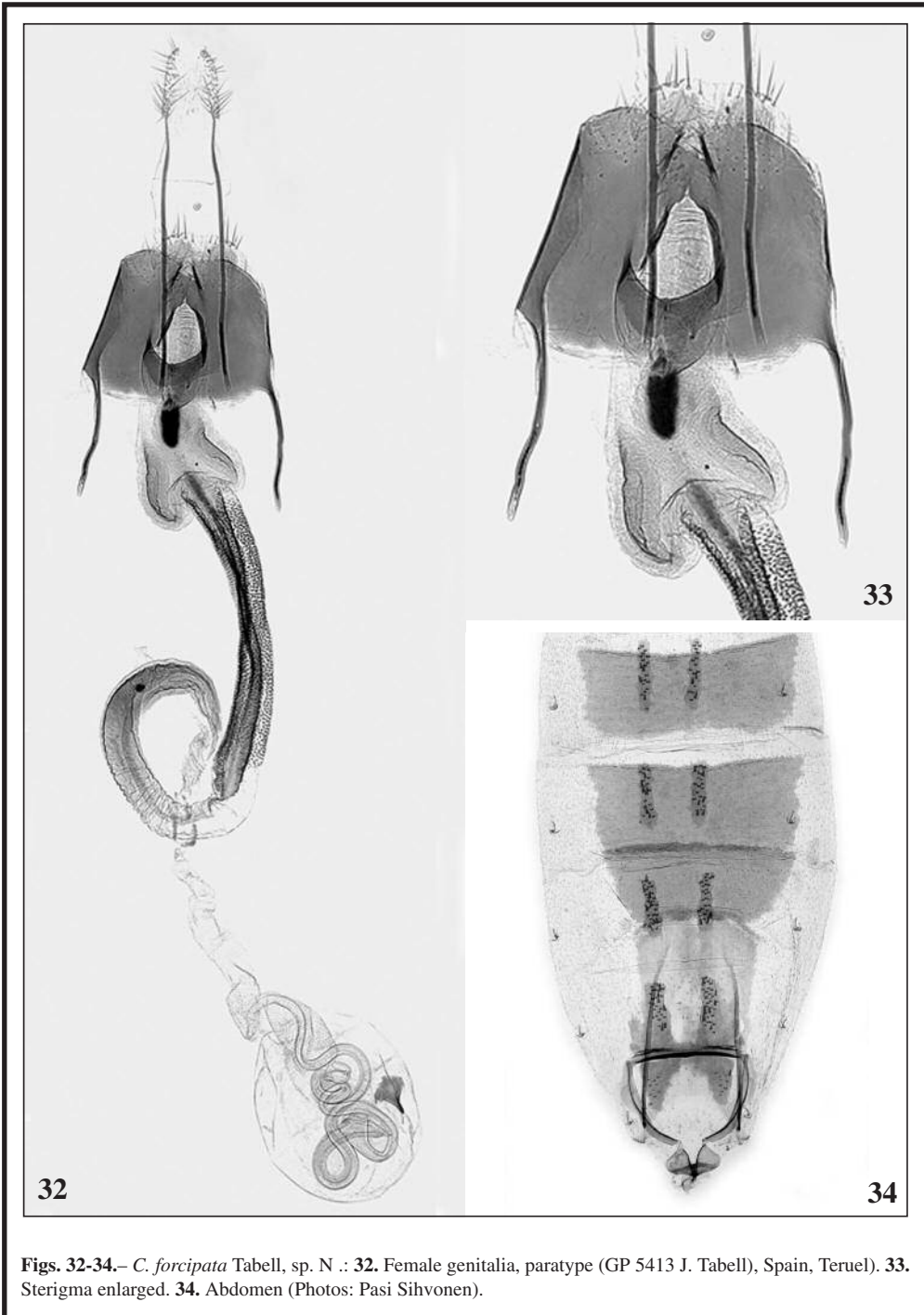
**Figs. 21-24.**– *C. aragonensis* Tabell, sp. n.: **21.** Male genitalia, holotype (GP 4680 J. Tabell), Spain, Teruel). **22.** Cucullus and sacculus enlarged. **23.** Cornuti enlarged. **24.** Abdomen (Photos: Reijo Siloaho).



**Figs. 25-27.**– *C. aragonensis* Tabell, sp. n.: **25.** Female genitalia, paratype (GP 4676 J. Tabell), Spain, Teruel). **26.** Sterigma enlarged (Photos: Reijo Siloaho). **27.** Abdomen (Photo: Pasi Sihvonen).



**Figs. 28-31.**– *C. forcipata* Tabell, sp. n.: **28.** Male genitalia, holotype (GP 4681 J. Tabell), Spain, Teruel. **29.** Cucullus and sacculus enlarged. **30.** Cornuti enlarged. **31.** Abdomen (Photos: Reijo Siloaho).



**Figs. 32-34.**– *C. forcipata* Tabell, sp. N. : **32.** Female genitalia, paratype (GP 5413 J. Tabell), Spain, Teruel). **33.** Sterigma enlarged. **34.** Abdomen (Photos: Pasi Sihvonen).